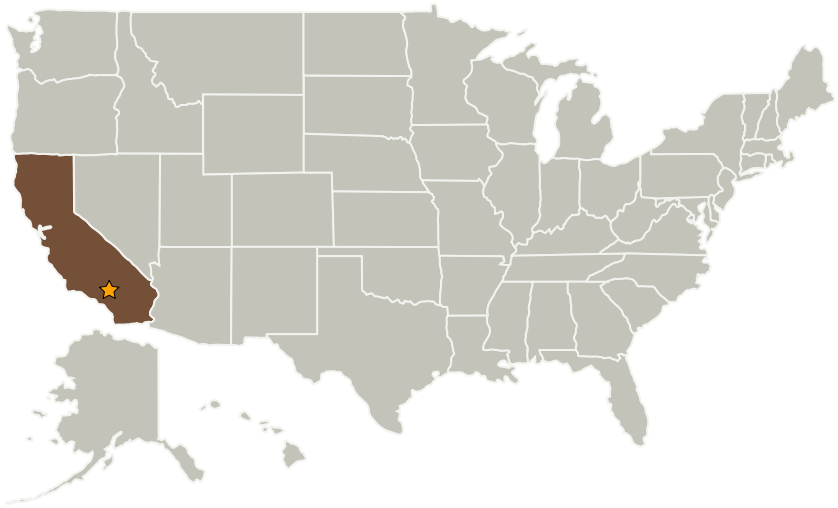
Dynamic Strain and Crack Monitoring Sensor, Phase II

Completed Technology Project (2007 - 2009)

Project Introduction

Los Gatos Research proposes to develop a new automated vehicle health monitoring sensor system capable of measuring loads and detecting crack, corrosion, and disbonding in advanced aerospace structures using a novel lock-in laser interrogation technique combined with a Bragg grating array (BGA) technology for strain and guided Lamb wave (GLW) sensing. Los Gatos Research's novel sensor instrumentation offers a number of advantages including sensor compactness (0.2mm x 0.2mm x 10mm), lightweight (few grams), remote data acquisition capability, low-cost, and low power consumption. The inherently reliable lock-in laser demodulation technique permit simultaneous measurements of strain, temperature, and acoustic fields with high resolution and high sensitivity. In Phase I, we have demonstrated feasibility by building a prototype instrument capable of measuring static and dynamic strain, temperature, and ultrasonic waves using a lock-in laser demodulation technique and a fiber Bragg grating array sensor network. In Phase II, LGR will deliver to NASA a rugged, compact, multi-channel instrument optimized for vehicle health monitoring studies including strain, temperature, and crack monitoring with high precision, high resolution, and high sensitivity. This dedicated prototype will include an integrated microcontroller, operate unattended, and address the power and stability requirements unique to in-flight studies.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
Los Gatos Research	Supporting Organization	Industry	Mountain View, California

Primary U.S. Work Locations
California

Project Transitions

February 2007: Project Start

February 2009: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.3 Mechanical Systems
    - TX12.3.4 Reliability, Life Assessment, and Health Monitoring